Claims

[c1]   1. A method for determining the physical location of a
device that has both wireless wide area network (WAN)
communication capability and wireless local area net-
work (LAN) communication capability, the method com-
prising steps of:
a. receiving a signal at the device from wireless WAN
equipment that causes the device to initiate a wireless
LAN location process; and
b. executing the wireless LAN location process to deter-
mine the physical location of the device.

[c2]   2. The method of claim 1, wherein the step of receiving
comprises receiving a signal of a type selected from the
group consisting of: mobile cell phone signal, multime-
dia messaging signal, short messaging signal and one-
way or two-way paging signal.

[c3]   3. The method of claim 1, and further comprising the
step of receiving a location request that includes an
identifier of the device to be located.

[c4]   4. The method of claim 3, in response to receiving the
location request, further comprising the step of sending

a signal to the wireless WAN equipment that requests the wireless WAN equipment to transmit the signal that causes the device to initiate the wireless LAN location process.

[c5] 5. The method of claim 3, wherein the step of receiving the location request comprises receiving a signal including an identifier selected from the group consisting of: name of device user, e-mail address, telephone number, multimedia messaging address, short messaging address, and pager number.

[c6] 6. The method of claim 3, and further comprising the step of verifying at least one of the identifier of the device and the party requesting the location of the device.

[c7] 7. The method of claim 1, wherein the step of executing the wireless LAN location process comprises executing a process that computes the location of the device based on one or more of: time of arrival data, time difference of arrival data, and received signal strength data, derived from a signal transmitted by the device.

[c8] 8. The method of claim 1, and further comprising the step of executing a software application in the device that initiates the wireless LAN location process.

[c9] 9. The method of claim 1, and further comprising, at a

computing device coupled to the wireless LAN, generating at least one signal to be transmitted by a wireless LAN device to the device and one or more other wireless LAN devices in order to set-up the wireless LAN location process.

[c10] 10. The method of claim 9, and further comprising, at the computing device, the step of processing data derived from one or more signals transmitted by the device to be located to determine the physical location of the device.

[c11] 11. The method of claim 1, and further comprising the step of terminating a wireless LAN connection at the device after completion of the wireless LAN location process.

[c12] 12. The method of claim 1, and further comprising the step of receiving at the wireless WAN equipment an emergency call from the device, and in response, transmitting the signal to the device that causes the device to initiate the wireless LAN location process.

[c13] 13. The method of claim 12, and further comprising the step of sending information describing the physical location of the device to an emergency responder facility.

[c14] 14. The method of claim 1, and further comprising the

step of downloading to the device a software application that the device uses to initiate the wireless LAN location process in response to receiving the signal from the wireless WAN equipment.

[c15] 15. The method of claim 1, and further comprising the step of sending location information of the device to a party.

[c16] 16. The method of claim 15, wherein the step of sending comprises sending the location information in the form of: an email message, voice message, paging message or web page link, and an identifier of the party is designated by a user of the device.

[c17] 17. The method of claim 15, wherein the step of sending comprises sending location information of the device to a party that requested location of the device.

[c18] 18. The method of claim 17, wherein the wireless WAN equipment transmits the signal to the device in response to receiving a request for location of the device by the party.

[c19] 19. A method in a device that has wireless wide area network (WAN) communication capability and wireless local area network (LAN) communication capability, the method comprising steps of:

a. receiving a signal from wireless WAN equipment that is intended to initiate a location procedure to locate the device; and

b. initiating a wireless LAN location process in response to receiving the signal.

[c20] 20. The method of claim 19, wherein the step of initiating comprises executing a software application in the device.

[c21] 21. The method of claim 19, wherein the step of initiating comprises transmitting a signal intended for processing by a computing device coupled to the wireless LAN.

[c22] 22. The method of claim 21, wherein in response to receiving the signal from the device further comprising the step of receiving a signal generated by the computing device that sets up the wireless LAN location procedure.

[c23] 23. The method of claim 19, and further comprising the step of terminating a wireless LAN connection after completion of the wireless LAN location process.

[c24] 24. The method of claim 19, and further comprising the step of initiating a wireless LAN connection if the device is not already connected to the wireless LAN when it receives the signal from the wireless WAN equipment.

[c25] 25. The method of claim 19, and further comprising the step of placing a call or sending a message that is processed by the wireless WAN equipment, which in response, transmits the signal to the device that causes the device to initiate the wireless LAN location process.

[c26] 26. The method of claim 25, wherein the step of placing the call comprises placing an emergency call.

[c27] 27. A method for determining the physical location of a device that has both wireless wide area network (WAN) communication capability and wireless local area network (LAN) communication capability, the method comprising steps of:
a. transmitting a wireless signal from the device, wherein the wireless signal includes information that indicates a location procedure is to be performed with respect to the device; and
b. executing a wireless LAN location process to determine the physical location of the device.

[c28] 28. The method of claim 27, wherein the step of transmitting comprises transmitting a wireless LAN signal.

[c29] 29. The method of claim 28, wherein the step of transmitting comprises placing a voice-over-IP call.

[c30] 30. The method of claim 28, and further comprising the step of receiving the wireless signal from the device, at a computing device, transmitting a signal to the wireless device to set-up the wireless LAN location procedure.

[c31] 31. The method of claim 30, wherein the step of executing comprises computing the location of the device based on data derived from at least one signal transmitted by the device and received at one or more other wireless LAN devices.

[c32] 32. The method of claim 27, wherein the step of transmitting comprises transmitting a wireless WAN signal.

[c33] 33. The method of claim 32, wherein the step of transmitting comprises placing an emergency call.

[c34] 34. The method of claim 32, wherein the step of transmitting comprises transmitting a message that includes an identifier of a party or destination to receive location information about the device.

[c35] 35. The method of claim 27, and further comprising the step of receiving the signal at wireless WAN equipment, and in response thereto, transmitting a signal to the device that causes the device to initiate the wireless LAN location.

[c36] 36. A wireless communication device comprising:

a. a radio receiver that receives wireless wide area network (WAN) signals;

b. a radio transceiver that transmits and receives wireless local area network (LAN) signals; and

c. a processor coupled to the radio receiver and to the radio transceiver that processes a signal received by the radio receiver from wireless WAN equipment that is intended to initiate a location procedure to enable the device to be located, and initiating a wireless LAN location process in response to receiving the signal.

[c37] 37. The device of claim 36, wherein the processor generates the signal for transmission via the wireless LAN to a computing device coupled to the wireless LAN, and processes a signal received from the computing device that sets up the wireless LAN location procedure.

[c38] 38. A method for managing a process for locating a device that has both wireless wide area network (WAN) communication capability and wireless local area network (LAN) communication capability, the method comprising steps of:

a. receiving from a party a request to locate the device;

b. verifying the party making the request and the device to be located;

c. sending a signal to wireless WAN equipment that

caused the wireless WAN equipment to transmit a signal to the device the causes the device to initiate a wireless LAN location process; and

d. receiving location information determined from the wireless LAN location process and delivering the location information to the party.

[c39] 39. A method for determining the physical location of a device that has both wireless relatively long-range communication capability and wireless relatively short-range communication capability, the method comprising steps of:

a. receiving a relatively long-range communication signal at the device from wireless equipment that causes the device to initiate a wireless short-range location process; and

b. executing the wireless short-range location process to determine the physical location of the device.

[c40] 40. A processor readable medium encoded with instructions that, when executed by a processor, perform steps of:

a. processing a signal received from wireless WAN equipment that is intended to initiate a location procedure to locate a device that receives the signal; and

b. initiating a wireless LAN location process in response to receiving the signal.

[c41] 41. A processor readable medium encoded with instructions that, when executed by a processor, perform steps of:

a. generating a wireless signal for transmission from the device, wherein the wireless signal includes information that indicates a location procedure is to be performed with respect to the device; and

b. initiating a wireless LAN location process to determine the physical location of the device.